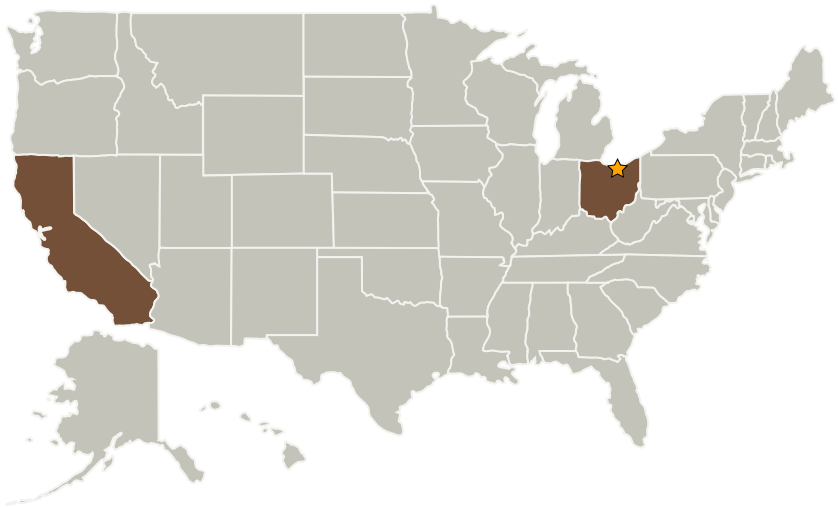
Time and Relative Distance Inertial Sensor, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

Precise location information is critical for crewmembers for safe EVA Moon and Mars exploration. Current inertial navigation systems are too bulky, fragile, and expensive for this purpose and therefore cannot meet NASA requirements. To address these requirements, Physical Optics Corporation (POC) proposes a novel Time and Relative Distance Inertial Navigation System (TARDIS), a compact, cost-effective solution providing EVA crewmembers and monitoring personnel with location and orientation to home base. With this information, TARDIS will generate a 3D navigation track of the astronaut's movement, which the astronaut can compare to a preplanned path, as well as key reference points, such as the base camp, rover, and destination. TARDIS builds on POC's smart inertial sensor cluster technology, integrating compact dedicated microprocessors with inertial microelectromechanical systems in a purely digital six-degree-of-freedom inertial navigation system in an extremely small volume. This is coupled with a Kalman filter for optimal position estimation. Spatial operator analysis (SOA) derives the relative orientation of an EVA crewmember's arms and legs to specify current activity (bending, walking, sitting, climbing). In Phase I POC will prove the concept by demonstrating a scaled-down working model with a limited number of sensors. In Phase II POC will demonstrate a complete working prototype.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Physical Optics Corporation	Supporting Organization	Industry	Torrance, California

Primary U.S. Work Locations	
California	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.2 Navigation Technologies
    - TX17.2.3 Navigation Sensors